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THE following communications were read:—

I. On the Latitude and Longitude of the Cape Observatory. By Mr. Henderson.

“ Mr. Fallows, from his observations made with Jones’s 6-foot mural circle, reckoned the latitude of this observatory to be $33^{\circ} 56' 4''$ south. From my own observations made with the same instrument, I find the angular distance between the south polar and horizontal points, measured upon the limb of the circle, or the latitude, to be $33^{\circ} 56' 2'', 8$. The polar point was determined by observations of the circumpolar stars, whose positions are given in the accompanying paper; the horizontal point by observations of various stars on both sides of the zenith, made by direct vision and by reflexion from the surface of quicksilver. This quantity may be found to require a small correction, when the whole of the observations, as well those already made as those still to be made, are properly reduced and combined together. In the mean time, the latitude which I have stated may be safely adopted for almost every purpose. Mr. Fallows reduced his observations by Dr. Young’s refractions. The table which I have employed is Bessel’s, contained in the *Tabula Regiomontana*.

“ For the determination of the longitude, Mr. Fallows, in the course of the years 1829 and 1830, made a great many observations of the transits of the moon and adjoining stars with Dollond’s 10-foot transit instrument. These I have compared with the corresponding observations of both limbs of the moon made at European observatories.”

Difference of Longitude between Greenwich and the Cape.

23 observations of 1st limb ...	1 ^h 14 ^m 0 ^s ,9	Mean diff. of observations	$\pm 7^s,2$
6 2d limb ...	1 13 51,3		$\pm 5,0$
	1 13 56,1	Cape, east of Greenwich.	

Cambridge and the Cape.

14 observations of 1st limb ...	1 ^h 13 ^m 35 ^s ,1	Mean difference	$\pm 5^s,8$
2 2d limb ...	1 13 27,9		$\pm 0,5$
	1 13 31,5	Cape, east of Cambridge.	

Difference of Longitude of Abo and the Cape.

15 observations of 1st limb ...	0 ^h 15 ^m 8 ^s ,3	Mean difference	$\pm 4^s,1$
4 2d limb ...	0 15 12,2		$\pm 1,0$
		0 15 10,2	Cape, west of Abo.

Edinburgh and the Cape.

12 observations of 1st limb ...	1 ^h 26 ^m 37 ^s ,2	Mean difference	$\pm 4^s,8$
3 2d limb ...	1 26 37,3		$\pm 1,8$
		1 26 37,2	Cape, east of Edinburgh.

Hence we have the longitude of the Cape, east of Greenwich,

Place.	Long. of Cape from that place.	Assumed Long. of place from Greenwich.	Long. of Cape.
By Greenwich.....			1 ^h 13 ^m 56 ^s ,1
Cambridge ...	1 ^h 13 ^m 31 ^s ,5	+ 0 ^h 0 ^m 23 ^s ,5	= 1 13 55,0
Abo.....	— 0 15 10,2	+ 1 29 8,8	= 1 13 58,6
Edinburgh ...	1 26 37,2	— 0 12 43,6	= 1 13 53,6
			Mean 1 13 55,8
			Or, in degrees... 18° 28' 57"

"It is not to be expected that subsequent investigations will materially alter the above result. I assume the geographical position of the Cape observatory to be 33° 56' 3" south latitude, 1^h 13^m 56^s east longitude, from Greenwich."

"It would be interesting to ascertain trigonometrically the distance betwixt this observatory and the known site of La Caille's in Cape Town. The longitude assigned by La Caille to his observatory, 1^h 4^m 18^s,5 east of Paris, and that computed by Encke from the observations of La Caille, Mason, Dixon, Wales, and Bayley, 1^h 4^m 20^s east of Paris, or 1^h 13^m 40^s and 1^h 13^m 41^s,5 east of Greenwich, agree remarkably well with the distance of this observatory from Cape Town,—about three and a half miles, in the direction of east by south."

"The hill and elevated land at the extremity of the Cape peninsula, forming the headland to which has been assigned the celebrated appellation of 'The Cape of Good Hope,' lie in the direct meridian of the observatory, and are visible from the immediate neighbourhood; but owing to the intervention of rising ground covered with trees, we have not been able to see them from the building. The hill overhanging the other headland, named 'False Cape,' or 'Hanglip,' is, however, visible from the observatory, but no part of the intervening sea named 'False Bay' can be seen, as the view is intercepted by the flat sandy downs of the Cape isthmus. Lieutenant Meadows, from observations made with a reflecting sextant, has determined the azimuth of False Cape to be 33° 57' east of the meridian of the observatory. Assuming the latitude of the hill over False Cape to be 34° 22' $\frac{1}{2}$, as laid down in Captain Owen's chart (the latitude of Cape Point or the Cape of Good Hope being 34° 22' by the same excellent authority), it follows that the difference of longitude between the observatory and False Cape is 21' 30"

of space. Hence the longitude of the two Capes may be stated as follows :—

Cape of Good Hope	18° 29' 0"
False Cape	18 50 30 east of Greenwich.

“ This longitude of the Cape Point differs only one mile from that given by La Caille (16° 10' east of Paris—*Memoirs of Academy of Sciences* for 1751, p. 425); and it is but justice to the memory of that distinguished astronomer to remark, that the lapse of eighty years, and the superior means which the present state of the science affords, have not been able to produce any improvement in the geographical position of this part of the world, as determined by him.”

II. Positions of Stars near the South Pole, from Observations made at the Observatory at the Cape of Good Hope. By Mr. Henderson.

“ It is well known that there is no conspicuous star near the South Pole, which can be observed in the day-time, even with the most powerful meridian telescopes that are used in observatories. In this respect astronomers in the southern hemisphere are not so fortunate as their northern brethren, who, in the stars α and δ *Ursæ Minoris*, possess two celestial objects that are admirably adapted for determining the polar positions of their instruments, not only from their visibility by day, but from their places having been correctly ascertained from numerous observations made in the first observatories.

“ In the southern hemisphere it becomes necessary to have recourse to stars of lesser magnitude, and even to increase their number, in order that one or more of them may pass the meridian at a convenient time of the night. Since my arrival at this observatory, in April last, seven circumpolar stars have been frequently observed with Dollond's 10-feet transit telescope, and Jones's 6-feet mural circle, for the purpose of determining the positions of these instruments with regard to the Pole: and the observations above and below the Pole having been compared together, the places of the stars have been already determined with a considerable degree of accuracy; and though it may be expected that subsequent observations will produce small changes in the calculated value, yet, in their present state, I believe that they may be of considerable use to astronomers; and I therefore take an early opportunity of communicating them.

“ The following is a catalogue of the mean positions of these stars, reduced to the beginning of 1832 (fictitious year of the Astronomical Society's Catalogue). In the reductions, the co-efficient of aberration was assumed to be 20",5; the other elements of reduction are the same as in the Society's Catalogue. The columns entitled “ annual change” denote the annual variations which take place in the yearly precessions, and which, being applied according to their signs to the precessions for the beginning of 1832, as in the

III. Various observations made at the Cape Observatory.

1. Observed right ascensions of the moon and stars, 1832, April 10 to October 17, inclusive; chiefly by Mr. Meadows. The clock errors depend upon the mean right ascensions of Bessel's fundamental stars contained in the *Berlin Ephemeris*, reduced to apparent right ascensions, with aberration $20''.5$; lunar nutation $9''.25$.

2. Observations of the moon and stars, made with the mural circle by Mr. Henderson, for the determination of the moon's parallax. 1832, July 20, to January 2, 1833.

3. Observations of *Mars* and stars, made with the mural circle, for the determination of the parallax of *Mars*, by Mr. Henderson, 1832, October 3 to November 25, inclusive. The readings of the zenith point of the instrument, during that period, are subjoined.

4. Eclipses of *Jupiter's* satellites, 1832, April 12 to October 19, compared with the computed times in the *Nautical Almanac*, regard being had to Mr. Jenkins's corrections; by Messrs. Henderson and Meadows.

5. Occultations of planets and fixed stars by the moon, 1832, August 10 to October 31; by Messrs. Henderson and Meadows.

6. Transit of *Mercury*, May 4 and 5, 1832; and micrometrical observations of the same with a divided object-glass, by Messrs. Henderson, Meadows, and Fayrer; with the longitude resulting from a comparison with the observations of the astronomer royal.

IV. On the Solar Parallax. By Mr. Shires.

V. On the determination of the true heights of distant mountains from their apparent elevations above the sea. By G. Blackburne, B.A.

The object of this investigation is to furnish a convenient formula for the computation of the terrestrial refraction in terms of the distance of the observer from the object and the apparent elevation; and secondly, for the computation of the true height of the object itself. Mr. Blackburne supposes that two observations have been made of the angle subtended by that part of the mountain which is visible above the sea horizon, at two stations, and that the distance of each from the foot of the mountain is known. He finds two expressions for the height in terms of the apparent altitude, distance, dip, and terrestrial refraction at each station, and, by equating these values, obtains an expression for the terrestrial refraction. If ϵ be the terrestrial refraction, D and D' the two distances, α and α' the visible altitudes, δ the dip of the horizon, and r the earth's radius, then

$$\sin \epsilon = D \left\{ \frac{(D + D' - 2\delta) \cdot (D - D') - 2r (D' \sin \alpha' - D \sin \alpha)}{2r \cdot (D + D' - \delta) \cdot (D - D')} \right\}$$

It is evident that the two distances must be *unequal*.

The true altitude of the mountain is easily found from either of the observations, when the terrestrial refraction is known.

If the true altitude were previously known, the terrestrial refraction might be found from the observed altitude at one station, the distance of which from the mountain is also known. In this case,

$$\sin \epsilon = \frac{(D - \delta)^2 + 2rD \sin \alpha - 2rH}{2r \cdot (D - \delta)},$$

where the symbols have the same signification as before.